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EXAMINER	
LIU, LI	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/19/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/19/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/797,814	KROPP, JORG-REINHARDT	
	Examiner	Art Unit	
	Li Liu	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The amended claims 1 recites the limitation "the coupling optics adapted to couple light between (a) the transmitting component and the receiving component and (b) the transmitting component and an optical waveguide" in line 6-7.

In the original disclosure and drawings, the coupling optics is used to couple light between the transmitting component and an optical waveguide, and the same coupling optics is also used to couple the receiving component and the optical waveguide. The transmitting component and the receiving component are arranged alongside one another or one above the other at the one side of the coupling optics, and the optical waveguide is at another side of the coupling optics. That is, the coupling optics is used

to couple light between "an optical waveguide 4 on the on hand" and "a transmitting component 1 or a receiving component 2 on the other hand" (page 19, line 15-19). The transmitting component and the receiving component are not coupled by the coupling optics. The original disclosure does not describe how the coupling optics is used to couple the transmitting component and the receiving component.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 7-9 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohnishi et al (US 5,555,334).

1). With regard to claim 1 (and in view of above 112 problem). Ohnishi et al discloses a bidirectional transmitting and receiving device Figure 1, comprising:

a transmitting component (the light emitting device 1 in Figure 1) comprising an emission area of a first size, that emits light at a first wavelength (e.g., 1.3 μm);

a receiving component (photodiode 7 in Figure 1) comprising a receiving area of a second size, that receives light at a second wavelength (e.g., 1.55 μm); and

coupling optics (3 and 6 in Figures 1 and 13 etc.) adapted to couple light between the receiving component (7 on sub-mount 11 in Figure 1) and an optical waveguide (5 in Figure 1), and to couple light between the transmitting component (1 on sub-mount 11 in Figure 1) and the optical waveguide (5 in Figure 1), wherein the coupling optics comprise a diffraction structure (e.g., 6 in Figures 1, 10 and 13) that focuses light at the first wavelength and at the second wavelength differently (108 and 100 in Figures 1 and 13, column 8, line 3-8, column 12, line 6-28), and

wherein the transmitting component and the receiving component are arranged alongside one another or one above the other (Figure 1, light emitting device 1 and light receiving device 7 are arranged alongside), and wherein the transmitting component is located at the focus of the diffraction structure for the emitted light at the first wavelength (column 10, line 43-58; 100 in Figures 1 and 13), and light that is emitted from the transmitting component at the first wavelength is imaged on an end surface (5 in Figure 1) of the optical waveguide (column 10, line 43-58).

2). With regard to claim 7. Ohnishi et al discloses wherein the diffraction structure comprises an optical grating (6 in Figures 1-3) in conjunction with a refractive lens (3 in Figures 1, 6 and 7), or an asymmetric diffractive lens (column 20, line 11-14), with the emitted light and the received light being deflected at different angles(column 9, line 30-34)

3). With regard to claim 8, Ohnishi et al discloses wherein wherein the transmitting component and the receiving component are arranged generally alongside one another (1 and 7 in Figures 1 and 13).

4). With regard to claim 9, Ohnishi et al discloses wherein the transmitting component is located at the focus of the diffraction structure for the emitted light at the first wavelength (Figure 1, light emitting device 1 is located at the focus of the diffraction structure 3 and 6 for the emitted light at 1.3 μm, column 10, line 43-58), and the receiving component is located at the focus of the diffraction structure for the received light at the second wavelength (Figure 1, light receiving device 7 is located at the focus of the diffraction structure 3 and 6 for received light at 1.55 μm; column 8, line 3-8, column 12, line 6-28).

5). With regard to claim 13, Ohnishi et al discloses wherein non-centric rings with a different phase relationship are provided for the diffraction structure that is in the form of an asymmetric diffractive lens (Figures 4, 5 and 10, column 7, line 2-65, column 12, line 10-17).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) as applied to claim 1 above, and in view of Kuhara et al (US 5,787,215).

1). With regard to claim 2, Ohnishi et al discloses all of the subject matter as applied to claim 1 above. And Ohnishi et al further discloses wherein the diffraction structure comprises a diffractive lens (3 in Figures 1 and 12-13), and wherein the transmitting component (1 in Figure 1) is located at the focus of the diffraction structure for the emitted light at the first wavelength (Figure 1, light receiving device 7 is located at the focus of the diffraction structure 3 and 6 for received light at 1.55 μm, column 8, line 3-8, column 12, line 6-28).

But Ohnishi et al does not expressly disclose while the receiving component (7 in Figure 1) is located away from the focus of the diffraction structure for the received light at the second wavelength, and light which is emitted from the optical waveguide at the second wavelength is detected in an area that is widened again or is not yet focused.

However, Kuhara et al, in the same filed endeavor, discloses a bidirectional transceiver, in which the receiving component (PD 64 in Figures 10 and 11) is located away from the focus for the received light at the second wavelength (λ_1 in Figures 11 and 12), and light which is emitted from the optical waveguide at the second wavelength is detected in an area (66 in Figures 10 and 11) that is not yet focused.

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Ohnishi et al discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD)

structure as taught by Kuhara et al to the system of Ohnishi et al so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

2). With regard to claim 3, Ohnishi et al in view of Kubara et al discloses all of the subject matter as applied to claims 1-3 above. But Ohnishi et al does not expressly disclose wherein the transmitting component and the receiving component are arranged one behind the other in the beam path, with the receiving area of the receiving component being larger than the emission area of the transmitting element by a factor of at least three.

However, Kuhara et al discloses a bidirectional transceiver, in which the transmitting component (LD in Figure 12) and the receiving component (PD in Figure 12) are arranged one behind the other in the beam path, with the receiving area (66 in Figure 10) of the receiving component being larger than the emission area of the transmitting element by a factor of at least three (the receiving surface of PD has a diameter up to 200 μm, column 21, line 37-38, which is three time larger than the emission area of the LD, which is usually less than 40μm).

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Ohnishi et al discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD)

structure as taught by Kuhara et al to the system of Ohnishi et al so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

3). With regard to claim 4, Ohnishi et al and Kubara et al discloses all of the subject matter as applied to claim 1 and 2 above. And Ohnishi et al in view of Kubara et al further discloses wherein the light (λ_2 in Figures 10 and 11 of Kuhara) that is emitted from the transmitting component (LD in Figures 10 and 11 of Kuhara) at the first wavelength passes through the receiving component (64 in Figure 10 of Kuhara).

4). With regard to claim 5, Ohnishi et al and Kubara et al discloses all of the subject matter as applied to claim 1-4 above. But Ohnishi et al does not disclose wherein the receiving component comprises a local transparent area in the region of the receiving area, through which the light that is emitted from the transmitting component passes.

However, Kuhara et al discloses the receiving component comprises a transparent area (the photodiode is a wavelength selective PD, it detects λ_1, but transparent to λ_2, Figures 10 and 11, column 4 line 8 line 30-42), in the region of the receiving area, through which the light (λ_2 in Figure 10) that is emitted from the transmitting component passes.

Kuhara et al provide a lower cost, smaller size LD/PD module with a lower loss of light and feasible to a long range bidirectional optical communication (column 7 line 41-58). Ohnishi et al discloses a diffraction structure that focuses light at the first wavelength and at the second wavelength differently and the PD and LD are arranged

alongside one another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the one (PD) above the other (LD) structure as taught by Kuhara et al to the system of Ohnishi et al so that a more flexible arrangement of light emitting and receiving can be obtained so to reduce cost and loss of signal.

5). With regard to claim 6, Ohnishi et al in view of Kubara et al discloses all of the subject matter as applied to claim 1 and 2 above. But Ohnishi et al and Kubara et al do not expressly disclose wherein the receiving component is mounted directly on the transmitting component by flip-chip mounting or adhesive bonding.

Although Ohnishi et al in view of Kubara et al doesn't specifically disclose the "mounting" by flip-chip mounting or adhesive bonding, such limitation are merely a matter of design choice and would have been obvious in the system of Ohnishi et al and Kubara et al. Kubara et al teaches that receiving component (64 in Figure 21A) is just above the transmitting component (70 in Figure 21A), and both PD and LD are then mounted on header 111 in Figure 21A through submounts 120 and 122. The limitations in claims 6 do not define a patentably distinct invention over that in Kubara et al since both the invention as a whole and Kubara et al are directed to arrange the receiving component above the transmitting component. Therefore, by flip-chip mounting or adhesive bonding or other kind of mounting would have been a matter of obvious design choice to one of ordinary skill in the art.

8. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) as applied to claims 1 and 7 above, and in view of Kuhara et al (US 5,787,215) and Yamagata et al (US 6,504,975).

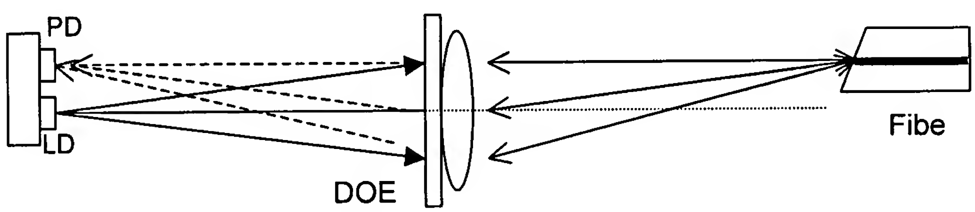
Ohnishi et al discloses all of the subject matter as applied to claim 1 and 7 above. And Ohnishi et al further discloses wherein the optical waveguide comprises an end surface that is inclined with respect to the optical waveguide axis (the end face 5 of the fiber in Figures 4 and 12-14 is inclined).

But Ohnishi et al does not expressly disclose wherein the refractive or diffractive lens is arranged laterally offset with respect to the optical waveguide axis (claim 10); and wherein the diffraction structure is arranged in the beam path such that the light that is emitted from the transmitting component passes between the transmitting component and the diffraction structure generally parallel to the optical waveguide axis (claim 11).

However, Kuhara et al, discloses a bidirectional transceiver, in which the optical waveguide comprises an end surface that is inclined with respect to the optical waveguide axis at an angle of 8 degrees for preventing reflected light from returning to the laser (137 in Figure 21A, column 27 line 41-44). And another prior art, Yamagata et al, in the same field of endeavor, disclose a system wherein the refractive or diffractive lens (1504 in Figure 15 or 1602 in Figure 16) is arranged laterally offset with respect to the optical waveguide axis (the axis of fiber 1506 in Figure 15 or 1606 in Figure 16); and wherein the diffraction structure is arranged in the beam path such that the light that is emitted from the transmitting component (1501 in Figure 15A or 1601 in Figure 16)

passes between the transmitting component and the diffraction structure generally parallel to the optical waveguide axis (Figures 15A and 16, column 19, line 13-63).

When the fiber end is cut at an angle of 8 degrees, due to the refraction the center axis of the input and output light will be tilted by a small angle with respect to the fiber core axis. Refer to following figure, if the diffractive lens is not arranged laterally offset with respect to the optical waveguide axis, the center of the intensity distribution of the light beam will not meet the center of the diffractive lens and power loss will occur.



Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the arrangement of the diffractive element as taught by Yamagata et al and Kuhara et al to the system of Ohnishi et al so that the light emitted from the LD passes between the LD and the diffraction structure generally parallel to the optical fiber axis, and power loss can be reduced, and a light reflected from the end surface is prevented from returning to the laser and interference is reduced.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) as applied to claims 1 and 7 above, and in view of Gal et al (US 5,600,486).

Ohnishi et al discloses all of the subject matter as applied to claims 1 and 7 above. But Ohnishi et al does not expressly wherein, in the diffraction structure that is in the form of an optical grating in conjunction with a refractive lens, the optical grating is formed or arranged on a planar face of a **plano-convex** lens.

However, Gal et al discloses an integrated lens, wherein, in the diffraction structure that is in the form of an optical grating in conjunction with a refractive lens, the optical grating is formed or arranged on a planar face of a **plano-convex** lens (Figure 2 right side, and 53 in Figure 11).

Gal et al provide an integrated diffractive optical element (DOE) lens with a high efficiency and excellent spatial separation of spectral. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the integrated diffractive optical element as taught by Gal et al to the system of Ohnishi et al so that a high efficiency integrated diffractive element can be obtained.

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) as applied to claim 1 above, and in view of Saito (JP 9[1997]-3252246).

Ohnishi et al discloses the device, further comprising a substrate having a first surface (e.g. the surface 6 or 20 of glass 2 in Figure 10 and Figure 12) that faces an optical waveguide that is to be coupled thereto, and having a second surface (the top surface sub-mount 11 in Figures 1 and 12) that is generally parallel to the former, wherein the diffraction structure is formed or arranged on the first surface (the grooves 20 or grating 6 is arranged on the first surface), and the receiving component (7 in

Figure 1 and 12) is arranged on the second surface and transmitting component (1 in Figures 1 and 12) is arranged at the side of the sub-mount 11.

But, Ohnishi et al does not expressly teach wherein the combination of the transmitting component and receiving component is arranged on the second surface.

However, to arrange the transmitting device and receiving device on the same surface is a well-known practice in the art. Saito discloses such an arrangement (Figure 1a).

Saito discloses a compact and low cost transceiver (page 4, [0007] and page 5, [0008]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the arrangement of the transmitting and receiving devices as taught by Saito to the system of Ohnishi et al so that a more compact and less expensive transceiver can be obtained.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) and Saito (JP 9[1997]-3252246) as applied to claims 1 and 14 above, and in further view of Hurt et al (US 2003/0007753).

Ohnishi et al (US 5,555,334) discloses all of the subject matter as applied to claims 1 and 14 above. But Ohnishi et al (US 5,555,334) does not expressly wherein the combination of the transmitting component and the receiving component is sheathed by a potting compound.

However, the transparency potting compound has been widely used for sheathing the photoelectrical elements so to secure the photoelectrical elements and prevent the interference from outside environment, Hurt et al discloses such kind of

potting compound (2 in Figure 1) to secure the photoelectrical element. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the potting compound as taught by Hurt et al to the system of Ohnishi et al so that the photoelectrical elements can be secured and interference from environment can be eliminated.

12. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohnishi et al (US 5,555,334) and Saito (JP 9[1997]-3252246) as applied to claims 1 and 14 above, and in further view of Cina et al (US 5,537,504).

Ohnishi et al and Saito disclose all of the subject matter as applied to claims 1 and 14 above. And, Ohnishi et al further discloses an optical transceiver module, in which the first surface of the substrate (the surface the diffractive grating 6 lays on, Figure 1) is connected to a sealing package 12, while the optical fiber is held by a fiber holder 14, both the package 12 and fiber holder 14 are fixedly secured to the stem 10. That is, through stem 10, the first surface and the guide element are integrated.

Another prior art, Cina et al, also discloses a fiber-optoelectronic subassembly, in which the first surface of the lens (3 in Figure 1) is connected to a guide element (2 in Figure 1) for connection of an optical waveguide.

Cina et al disclose optical transmission modules with a small size, low cost and simpler alignment. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the similar assembly as taught by Cina et al to the system of Ohnishi et al so that the first surface is directly connected to the

guide element and a compact transceiver with a small size, low cost and simpler alignment can be obtained.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Forrest et al (US 4,709,413) discloses a bidirectional fiber system in which at one terminal the output of a light source (LED or LD) is coupled through a small diameter hole in the active area of a photodiode into the core of fiber.

Katayama (US 5,696,750) discloses a optical head apparatus in which the light source is above the photodiode, and the active area of a photodiode is much larger than the light emitting area (Figures 14 and 22).

Jewell et al (US 6,243,508) discloses a novel electro-opto-mechanical assembly.

Asghari (US 6,498,666) discloses an integrated optical transceiver.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
April 5, 2007

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER